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195. Proposed by CHRISTIAN HORNUNG, Heidelberg University, Tiffin, O.

Given a right cone of altitude  $h$  and radius  $r$ , to locate the plane parallel to its side which bisects the cone.

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### MECHANICS.

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175. Proposed by J. F. LAWRENCE, A. B., Professor of Mathematics. Oklahoma Agricultural College, Stillwater, Oklahoma.

A cylinder descends down a plane, the inclination of which to the horizon is  $\alpha$ , unwrapping a fine string fixed at the highest point of the plane. Find the angle through which the plane must be depressed in order that a sphere, descending under like circumstances, may experience the same acceleration.

176. Proposed by A. H. HOLMES, Brunswick, Me.

A solid cube weighs 300 pounds. If a power is applied at an angle of  $45^\circ$  at an upper edge of the cube, how many foot-pounds will be required to overturn the cube?

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### DIOPHANTINE ANALYSIS.

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126. Proposed by R. A. THOMPSON, M. A., C. E., Engineer Railroad Commission of Texas.

Eight persons wish to play a series of games of progressive duplicate whist. In one evening, 12 boards are played, 4 boards (and return) by one couple against each of the other three couples, the same partners being retained throughout one evening. How many evenings will be required to complete the series, and what is the order of play, it being required that each player shall play with every other player as partner, and that each couple shall play once and but once against every other couple.

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### AVERAGE AND PROBABILITY.

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162. Proposed by F. P. MATZ, Ph. D., Sc. D., Reading, Pa.

Two points are taken at random in the surface of a circle and a chord is drawn through them. Find the average area of the segment containing the center of the circle.

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### GROUP THEORY.

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7. Proposed by M. E. GRABER, A. M., Heidelberg University, Tiffin, Ohio.

Which linear substitution will transform  $x_1x_2 + x_3x_4 + x_5x_6 = 0$  into  $y_1^2 + y_2^2 + y_3^2 - y_4^2 - y_5y_6 = 0$ ?